

Please replace the Table at the top of page 21 as follows:

	Phase	Δn	Threshold voltage/V
According to the invention	≤ -20 to ≥ 80	≤ 0.10	≤ 1.9
Preferred	≤ -30 to ≥ 90	≤ 0.08	≤ 1.7
Particularly preferred	≤ -40 to ≥ 80	≤ 0.07	≤ 1.5

IN THE CLAIMS

Cancel claims 1-10 without prejudice or disclaimer in favor of the new claims added in the attached appendix (since all of the claims are replaced with new claims a marked up version is not appropriate):

New claims 11-25 in attached appendix.

REMARKS

The Amendments

The specification is amended to correct minor informalities. Included in those corrections is adding missing formulae II1a and II1b at page 14. It is evident from the context that these formulae were inadvertently missing from the application. Support for the formulae are found, e.g., in the priority documents; see, e.g., page 13, lines 16-24, of the DE 19909238.9 priority document. Also included is an amendment to the table on page 21; support for this amendment is found at page 20, line 18.

The claims are replaced with new claims which are more suitable to U.S. practice and which recite certain properties of the medium. Support for the claims is found in the original claims and in throughout the specification; see, e.g., page 1, lines 10-12; page 3, lines 1-2, page 20, line 1 and lines 17-19; and Examples 2 and 5, both showing a Δn of just below 0.110.

The amendments should not be interpreted as an acquiescence to any objection or rejection made in this application but are made only to clarify the invention and/or expedite

the prosecution of this application. To the extent that the amendments avoid the prior art, competitors are warned that the amendments are not intended to and do not limit the scope of equivalents which may be asserted on subject matter outside the literal scope of any patented claims but not anticipated or rendered obvious by the prior art. Applicants reserve the right to file one or more continuing and/or divisional applications directed to any subject matter disclosed in the application which has been canceled by any of the above amendments.

References of Record

The Office Action cites to several references but no copies of these references were provided and no PTO-892 form was provided. Although applicants were able to obtain copies of the references referred to in the rejections, it is not clear whether other references may also be of record. Further, it is believed that, without an 892 form, the references which are mentioned may not officially be of record. Thus, applicants request that an 892 form listing the references made of record by the Examiner be provided.

Priority Documents

Certified priority documents for the three DE applications for which priority is claimed are submitted herewith.

The Rejections/Objections under 35 U.S.C. §101 and §112

The rejection and/or objections made under 35 U.S.C. §101 and 35 U.S.C. §112 are believed to be overcome by the replacement of the claims with new claims which avoid the objected to matter.

The First Rejection under 35 U.S.C. §103

The rejection of claims 1 and 3-10 under 35 U.S.C. §103 as being obvious over Ichinose (U.S. Patent No. 6,066,268) is respectfully traversed.

Ichinose is directed to liquid-crystal media based on a mixture of polar compounds having negative dielectric anisotropy; see, e.g., col. 1, lines 3-5. The Ichinose invention

has an object to provide MLC displays based on the ECB effect; see, e.g., col. 3, lines 18-22. The reference teaches that liquid crystalline phases for providing the ECB effect must exhibit a negative dielectric anisotropy of -0.5 to -5.0; see, e.g., col. 1, lines 51-60.

Ichinose fails to teach liquid-crystal media which exhibit a positive dielectric anisotropy. To the contrary, as described above, the media taught by Ichinose are required to exhibit negative dielectric anisotropy. It would not have been obvious to modify the media of Ichinose to provide a medium with positive dielectric anisotropy. Such would be contrary to the objectives of Ichinose. Contrary to providing the necessary motivation to modify the reference teachings, Ichinose directs one of ordinary skill in the art away from the currently claimed invention. Accordingly, it is urged that the rejection under 35 U.S.C. §103 based on Ichinose should be withdrawn.

The Second Rejection under 35 U.S.C. §103

The rejection of claims 1-10 under 35 U.S.C. §103 as being obvious over Hirschmann (U.S. Patent No. 6,056,894) is respectfully traversed.

Hirschmann is directed to TN and STN displays and to liquid-crystal media therefor. The LC media of Hirschmann require the presence of a compound of the formula IB and a compound of the formula IA; see, e.g., col. 2, lines 4-34. Other than the required components of formula IA and IB, the Hirschmann media optionally may include a large variety of other LC compounds, including those of the formulae mentioned in the Office Action.

Neither of the two required compounds in the Hirschmann media include compounds of the two required compounds of applicants' media (i.e., of formula I or II of claim 11). Further, neither of applicants' formula I or II encompass compounds which are required in the Hirschmann media. Although Hirschmann discloses some formulae which may overlap with applicants' formula I (i.e., formulae III of the reference) and formula II (i.e., formulae V, VI, VII and VIII), there is no suggestion in Hirschmann providing any specific direction to one of ordinary skill in the art to pick and choose compounds from each of these optional components so as to provide the particular combination of applicants' media. There do not appear to be any examples which combine a compound of


the formula I and of formula II of applicants' claims. That the Hirschmann media have different properties from those of applicants' invention (see below) supports this conclusion. It is respectfully submitted, therefore, that Hirschmann provides no fair suggestion of applicants' invention. Despite its generic teachings, Hirschmann fails to direct one of ordinary skill in the art to the combination of applicants' invention, instead directed those of ordinary skill in the art to combinations of compounds distinct from those required in applicants' invention. For this reason alone, the rejection under 35 U.S.C. §103 should be withdrawn.

An additional distinction of the Hirschmann reference is the failure of Hirschmann to disclose or suggest media having the combination of positive dielectric anisotropy and relatively low birefringence of applicants' invention. The reference indicates a preference for high birefringence, Δn , values; see, e.g., col. 27, lines 38-43. And, although the reference does state that media with lower Δn values may be useful, they are not preferred. Further, the reference never quantifies what was intended by such lower Δn values. The only quantification of useful Δn values disclosed by Hirschmann is in its Examples. There, the minimum Δn value exhibited by a medium of Hirschmann is 0.1211 in Example 1 and the values for Δn range up to 0.1449 in Example 15. Accordingly, it is believed to be clear that, whatever was intended by Hirschmann's statements regarding relatively high or low Δn values, the reference does not contemplate media having a Δn as low as 0.11, certainly not as low as 0.1038, 0.10 or 0.08; compare new claims 22-24. For this additional reason, it is respectfully submitted that the rejection under 35 U.S.C. §103 should be withdrawn.

For all of the above reasons, it is urged that Hirschmann fails to render the claimed invention obvious to one of ordinary skill in the art and the rejection under 35 U.S.C. §103 should be withdrawn.

It is submitted that the claims are in condition for allowance. However, the Examiner is kindly invited to contact the undersigned to discuss any unresolved matters.

Respectfully submitted,

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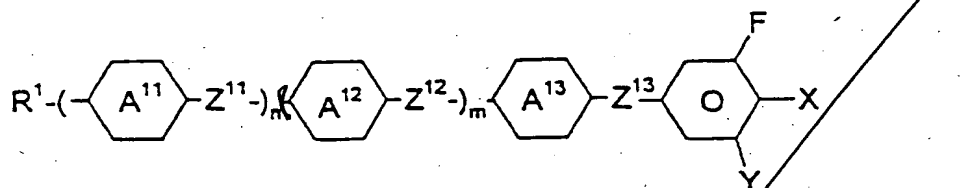
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APPENDIX

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11. A nematic liquid-crystal medium, comprising

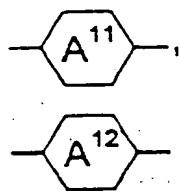
a) one or more dielectrically positive compound(s) of the formula I



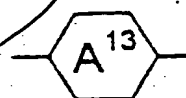
in which

R^1 is alkyl or alkoxy having 1 to 7 carbon atoms, alkoxyalkyl, alkenyl or alkenyloxy having 2 to 7 carbon atoms,

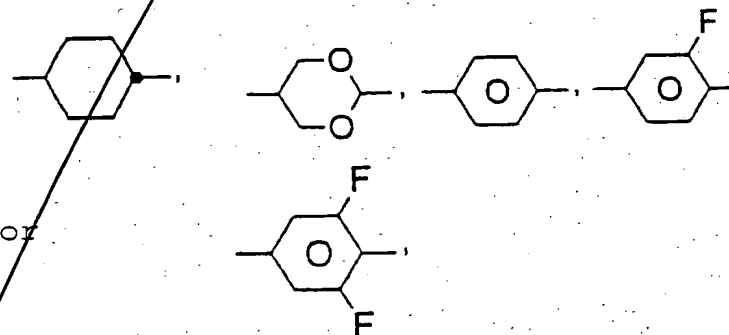
Z^{11} , Z^{12} and Z^{13} are each, independently of one another, $-\text{CH}_2-\text{CH}_2-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{COO}-$ or a single bond,



and



are each, independently of one another,



X

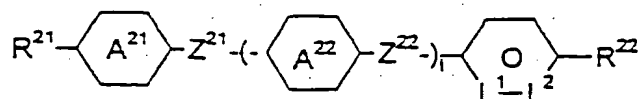
is F, OCF_2H or OCF_3 ,

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where, in the case where $X = F$ or OCF_2H , Y is F ,
and in the case where $X = OCF_3$, Y is H or F , and

n and m are each, independently of one
another, 0 or 1;

b) one or more dielectrically negative compound(s)
of the formula II

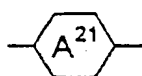


II

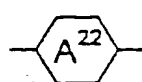
in which

R^{21} and R^{22} are each, independently of one
another, as defined for R^1 under the
formula I,

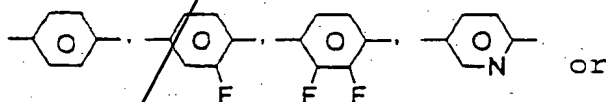
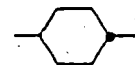
Z^{21} and Z^{22} are each, independently of one
another, as defined for Z^{11} above
under the formula I,



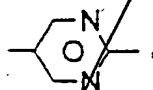
and



are each, independently of one another,



or

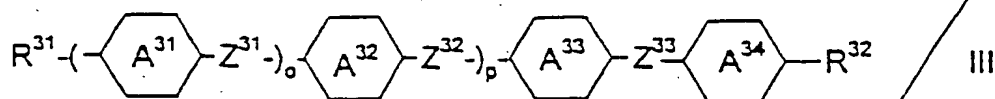


L^1 and L^2 are both $C-F$ or one of the two is N
and the other is $C-F$, and

l^1 is 0 or 1;

and optionally

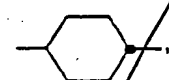
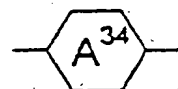
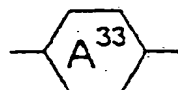
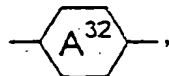
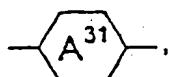
c) one or more dielectrically neutral compound(s) of the formula III



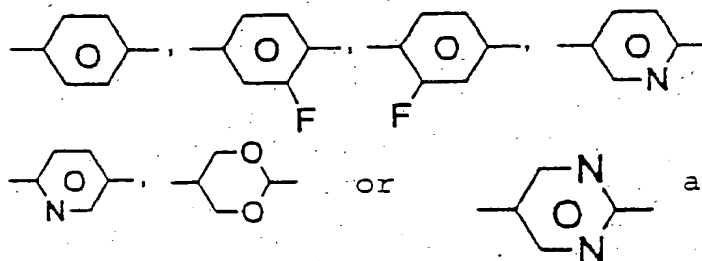
in which

R^{31} and R^{32} are each, independently of one another, as defined for R^1 above under the formula I, and

Z^{31} , Z^{32} and Z^{33} are each, independently of one another, $-CH_2CH_2-$, $-CH_2O-$, $-OCH_2-$, $-CF_2O-$, $-OCF_2-$, $-COO-$ or a single bond, and, additionally, one of Z^{31} , Z^{32} and Z^{33} may also be $-CF_2CF_2-$,

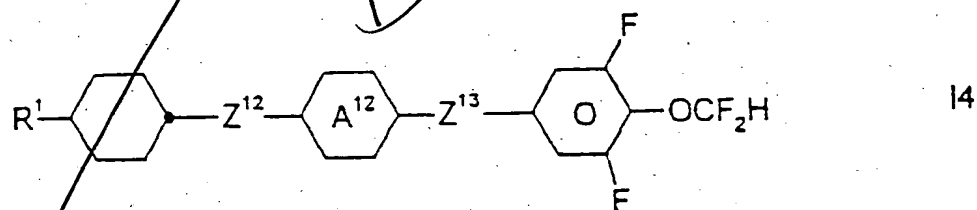
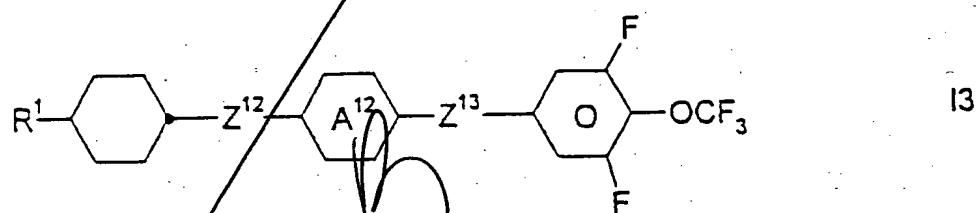
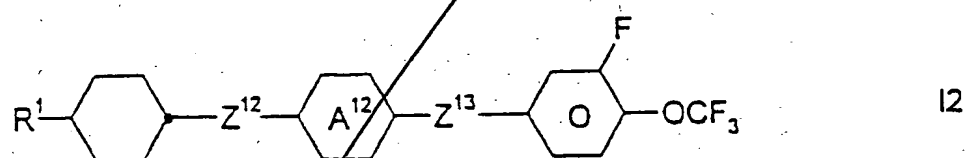
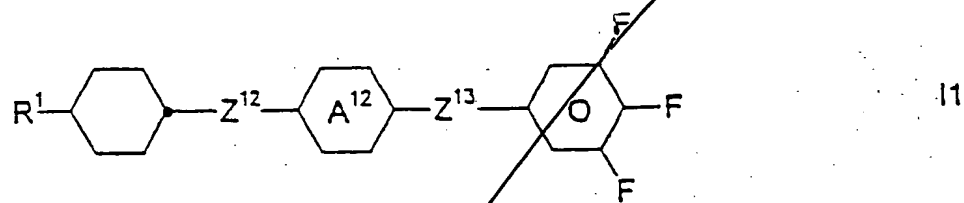


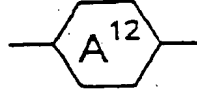
are each, independently of one another,



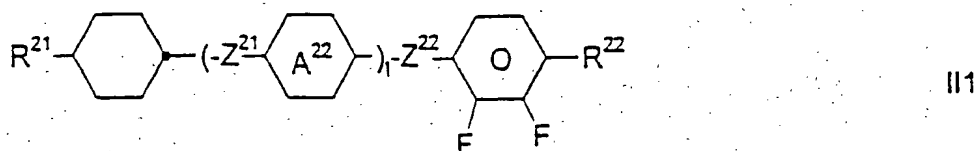
o and p , independently of one another, are 0 or 1, wherein the medium has a positive dielectric anisotropy and a birefringence, Δn , of less than or equal to 0.11.

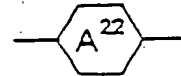
12. The liquid-crystal medium of claim 11 which comprises one or more compounds selected from the group of compounds of the formulae I1 to I4:



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 in which R^1 , Z^{12} , Z^{13} and  are each as defined for formula I in Claim 11.

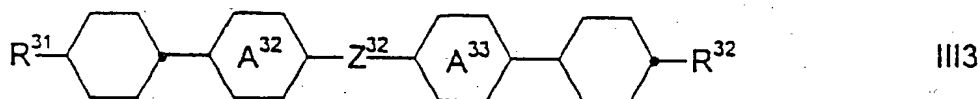
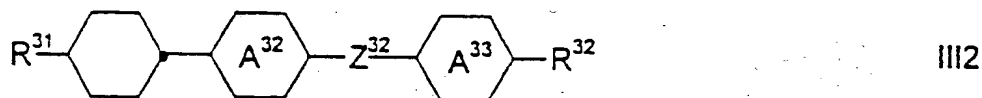
13. The liquid-crystal medium of Claim 11, which comprises one or more compounds of the formula III

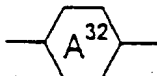
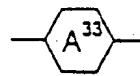


in which R^{21} , R^{22} , Z^{21} , Z^{22} ,  and l are as defined in Claim 11.

14. The liquid-crystal medium of Claim 11, which comprises at least one compound of the formula III.

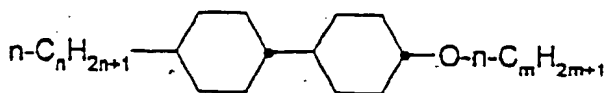
15. The liquid-crystal medium of Claim 11, which comprises one or more compounds selected from the group consisting of the compounds of the formulae III1 to III3



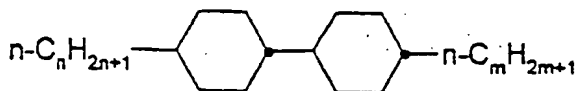
in which R^{31} , R^{32} , Z^{31} , Z^{32} ,  and 

are each as defined for formula III in Claim 11.

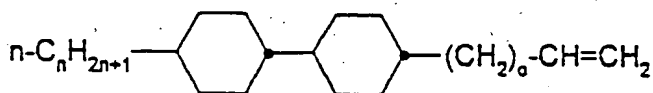
103 16. The liquid-crystal medium of Claim 11, which comprises one or more compounds selected from the group consisting of the compounds of the formulae III1a to III1d



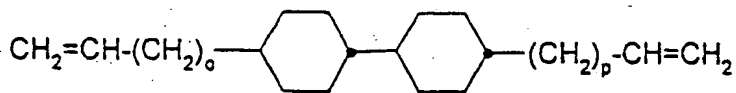
III1a



III1b



III1c



III1d

in which n and m are each, independently of one another, from 1 to 5, and o and p are each, both independently thereof and from one another, from 0 to 3.

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cont 107

Exap 1

17. The liquid-crystal medium of Claim 11, which comprises in total

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from 50% to 70% of compounds of the formula I,
from 5% to 30% of compounds of the formula II and
from 10% to 40% of compounds of the formula III.

X

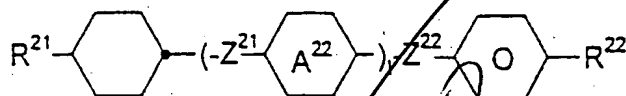
18. An electro-optical display comprising a liquid-crystal medium of claim 11.

O

19. The display of Claim 18, which is an active matrix display having a matrix of three-pole active switches.

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20. The liquid-crystal medium of Claim 12, which comprises one or more compounds of the formula III



III

in which R^{21} , R^{22} , Z^{21} , Z^{22} , A^{22} and l are as defined for formula II in Claim 11.

21. The liquid-crystal medium of Claim 12, which comprises at least one compound of the formula III.

22. The liquid-crystal medium of claim 11, wherein the birefringence of the medium is 0.1038 or less.

23. The liquid-crystal medium of claim 11, wherein the birefringence of the medium is 0.10 or less.

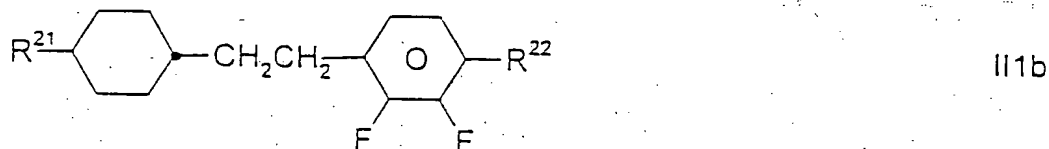
24. The liquid-crystal medium of claim 11, wherein the birefringence of the medium is 0.08 or less.

25. The liquid-crystal medium of claim 11, wherein the medium exhibits a nematic phase at from -20°C to 80°C .

MARKED-UP VERSION

Please replace the paragraph at page 14, lines 13-15 as follows:

The liquid-crystal media particularly preferably comprise one or more compounds selected from the group of compounds of the formulae II1a to II1e:



Please replace the Table at the top of page 21 as follows:

	Phase	Δn	Threshold voltage/V
According to the invention	≤ -20 to ≥ 80	≤ 0.10	≤ 1.9
Preferred	≤ -30 to ≥ 90	≤ 0.08	≤ 1.7
Particularly preferred	≤ -40 to ≥ 80	≤ 0.07	≤ 1.5